Service Encapsulation-Based Model for Smart Campus

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ABSTRACT
Currently, many universities are equipping information facilities, the informatization construction on which the basis of Internet and the information service in the campus begins. The smart campus is an advanced stage in the construction of campus informatization, which can make the daily life in a campus more convenient. This paper analyzes the current construction of campus informatization, proposes an intelligent campus space model, and discusses key technologies based on the idea of object-oriented technique and service encapsulation. This model can support most campus activities, such as access control, e-commerce, and e-services.

Keywords: Information Service, Model, Object-Oriented, Service Encapsulation, Smart Campus

INTRODUCTION
With the continuous development of information society, the computing model is developing from desktop computing to a ubiquitous network computing or pervasive computing. Based on ubiquitous computing or pervasive computing, it is proposed to extend the living space, and has gradually put a higher demand on the development of intelligent, which leads to the concept of the smart space (Kortuem, Kawsar, Fitton, & Sundramoorthy, 2010). Smart Space is a specific space which contains wide range of intelligent devices (such as home, a schoolyard, etc.) (Yu, 2009). Smart Space can make people and computing environments to integrate better, and people can unknowingly enjoy smart space services through the computing environment in the smart space. Smart Campus is the senior stage of the process of campus information, thus the idea of intelligent space should be applied to the process of campus information.

However, the digital campus resources haven’t solve the problem of unreasonable allocation of resources in the campus, such as the limited study room, people crowding in canteen and other facilities during the peak period (Cheng, Yin, & Yin, 2011).

To solve these problems, this paper combined the digital campus with the concept of intelligent building, and studied the campus intelligent in order to fundamentally improve allocation of resources in campus and enhance
learning, life and work efficiency. Intelligent campus is a unique combination of high-tech and modern architecture. It is based on the building as a platform. It also has construction equipment, office automation and communication network system, as well as a set of structures, systems, services, management and their optimal combination. It can provide a safe, efficient, comfortable, convenient environment to the teachers and students. It is designed to make full use of limited resources, break the campus resources restrictions among time, space and age, especially the development of technologies like geographic information systems, will bring greater benefits to the specialization of smart campus.

THEORIES AND CONCEPTS

Smart Campus and Intelligent Building

The concept of intelligent campus is expanded from the basic meaning of intelligent building. It has no standard definition and specification currently. Intelligent campus construction is still at the exploratory stage. The so-called intelligent building is a kind of reasonable investment building which can provide convenient, efficient, safe and comfortable working environment. It is in accordance with the systems engineering concept, and optimize the combination of four basic elements (i.e., system integration): the structure of the building (construction and environmental structure), the system (intelligent systems), services (households, user demand for services) and management (property operation and management) (Johnny & Heng, 2006; Tian, Kang, & Dong, 2010). From a manager’s point of view, the intelligent building should have a set of control, management, operation and maintenance of communication facilities; from the user’s point of view, the intelligent building should help to improve the work efficiency, to stimulate creative learning, working and living environment (Wang, Xu, Cao, & Zhang, 2007; Gao & Dou, 2010). Building is the campus’s entity constituted. So this study can learn from the related concept of intelligent building. However, it should be emphasized that the smart campus is a larger system, system planning and designing methodology is needed to study and solve.

Smart Campus and Digital Campus

Digital campus (Tang, Tang, Yang, & Cui, 2010) is based on network and takes use of advanced information means and tools. It achieves the digitization from the environment including resources like equipment, classrooms (such as books, handouts, courseware, etc.) to activities (including teaching, learning, management, service, office, etc.). It can build a digital space based on traditional campus to expand the time and space dimensions of the real campus, to enhance the efficiency of the traditional campus, and expand the functionality of the traditional campus. It ultimately realizes the education process’s comprehensive informatization, so as to achieve the purpose of improving the level and efficiency of education management (Kang, 2010).

Typically, the implementation of smart campus must go through roughly three phases. The first stage is campus network infrastructure. This stage focuses on campus LAN infrastructure, which is characterized by the lack of data, information resource, application, integration; the second phase is the construction of digital campus application. The network infrastructure in this stage has a certain size and level. It has basically realized management informatization, teaching, research informatization, and library resources informatization; the third stage is the integration of intelligent campus construction phase. This stage fuses smart buildings, smart community technology and integrated management concept into the digital campus, to form a true sense of the intelligent campus. This stage achieves full concordance and integration of various systems and applications to become an organic whole. It is the advanced stage of development of digital campus. Thus, the intelligent campus is built on the basis of a more complete digital campus.
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